

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2004/034455

International filing date (day/month/year)
13.10.2004

Priority date (day/month/year)
14.10.2003

International Patent Classification (IPC) or both national classification and IPC
C07C19/08, C07C17/20, C07C17/21, C07C17/23

Applicant
E.I. DUPONT DE NEMOURS AND COMPANY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl
Fax: +31 70 340 - 3016

Authorized Officer

Kardinal, S

Telephone No. +31 70 340-3483



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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V.

1. The following documents are referred to in this communication :

D1 : US 5 763 706 A (TUNG ET AL) 9 June 1998
D2 : EP 0 611 744 A (BAYER AG) 24 August 1994
D3 : EP 0 442 075 A (BAYER AG) 21 August 1991
D4 : WO 98/10862 A (ICI) 19 March 1998
D5 : EP 0 657 408 A (ELF ATOCHEM S.A) 14 June 1995

2. Novelty

2.1 The document D1 discloses (cf. the passages cited in the international search report) a process for the preparation of a mixture of 1,1,1,3,3-penta-fluoropropane and 1,1,1,3,3,3-hexafluoropropane by fluorination of a mixture of the corresponding chlorides.

The subject-matter of independent claim 1 relates to the fluorination of halopropenes followed by hydrodechlorination and differs from this known process.

2.2 The document D2 discloses (cf. the passages cited in the international search report) a process for the preparation of 1,1,1,3,3-pentafluoropropane by catalytic hydrodechlorination of 1,1,1,3,3-pentafluoro-2-chloropropane or 1,1,1,3,3-pentafluoro-2,2,3-trichloropropane which may be prepared by fluorination or chlorofluorination of chlorinated propene.

The subject-matter of independent claim 1 differs from this known process in the catalyst used for the fluorination reaction and in the co-production of 1,1,1,3,3-pentafluoropropane and 1,1,1,3,3,3-hexafluoropropane.

2.3 The document D3 discloses (cf. the passages cited in the international search report) a process for the preparation of 1,1,1,3,3,3-hexafluoropropane by fluorination of hexachloropropene in the presence of a magnesium-activated chromium oxide catalyst leading to 1,1,1,3,3,3-hexafluoropropane and 1,1,1,3,3,3-hexafluoro-2-

chloropropane and 1,1,1,3,3,3-hexafluoro-2,2-dichloropropane which are catalytically hydrodechlorinated. By-produced under-fluorinated propenes may be recycled to the fluorination step.

The subject-matter of independent claim 1 differs from this known process in the catalyst used for the fluorination reaction and in the co-production of 1,1,1,3,3-pentafluoropropane and 1,1,1,3,3,3-hexafluoropropane.

2.4 The documents D4 and D5 disclose (cf. the passages cited in the international search report) catalysts as described in claim 1 for use in the fluorination of halogenated hydrocarbons.

A fluorination of halogenated propenes according to claim 1 is not disclosed.

2.5 The subject-matter of independent claim 1 and dependent claims 2-7 is therefore novel (Article 33(2) PCT).

3. Inventive Step

3.1 Any of the documents D1-D3 may be considered as being the closest prior art.

3.2 Starting from D1, pertaining to the preparation of the same target compounds, the problem to be solved by the present invention may be regarded as provision of an alternative process for the production of 1,1,1,3,3-pentafluoropropane and 1,1,1,3,3,3-hexafluoropropane.

The solution to this problem proposed in claims 1-7 of the present application is considered as involving an inventive step (Article 33(3) PCT), because there was no teaching in the prior art (D1-D5) that would have lead the skilled person to combine the features of D1 and D2 or D3 while using a catalyst according to D4 or D5 to arrive at a process according to claim 1.

3.3 Starting from D2 or D3, each disclosing the production of one of the two target compounds from halogenated propenes, there was not teaching in the prior art to

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modify the processes according to D2 or D3 such as to produce both 1,1,1,3,3-pentafluoropropane and 1,1,1,3,3,3-hexafluoropropane (as in D1) while using a catalyst as disclosed in D4 or D5.